

INTERPLANETARY TRANSIT SIMULATIONS USING THE INTERNATIONAL SPACE STATION

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It has been suggested that the International Space Station (ISS) be utilized to simulate the transit portion of long-duration missions to Mars and near-Earth asteroids (NEA). The ISS offers a unique environment for such simulations, providing researchers with a high-fidelity platform to study, enhance, and validate technologies and countermeasures for these long-duration missions. From a space life sciences perspective, two major categories of human research activities have been identified that will harness the various capabilities of the ISS during the proposed simulations. The first category includes studies that require the use of the ISS, typically because of the need for prolonged weightlessness. The ISS is currently the only available platform capable of providing researchers with access to a weightless environment over an extended duration. In addition, the ISS offers high fidelity for other fundamental space environmental factors, such as isolation, distance, and accessibility. The second category includes studies that do not require use of the ISS in the strictest sense, but can exploit its use to maximize their scientific return more efficiently and productively than in ground-based simulations. In addition to conducting Mars and NEA simulations on the ISS, increasing the current increment duration on the ISS from 6 months to a longer duration will provide opportunities for enhanced and focused research relevant to long-duration Mars and NEA missions. Although it is currently believed that increasing the ISS crew increment duration to 9 or even 12 months will pose little additional risk to crewmembers, additional medical monitoring capabilities may be required beyond those currently used for the ISS operations. The use of the ISS to simulate aspects of Mars and NEA missions seems practical, and it is recommended that planning begin soon, in close consultation with all international partners.